



TechTalk

The First Human Head

Transplant ©

by John McCarthy

Hi and a warm welcome once again to TechTalk. In a survey conducted recently, it transpired that most people associated hi-tech with electronics such as computers, mobile phones, HD televisions, green energies, and space travel. A surprisingly small number mentioned medicine and surgery. Next year, we'll be celebrating the 50th anniversary of the first human heart transplant which took place in December 1967 in South Africa, conducted by Dr Christiaan Barnard. The heart of a 25-year-old woman who'd died following a car crash was placed in the chest of a 55-year-old man dying of heart damage. The recipient lived for 18 days. This relative success did much to generate reserved optimism that heart transplantation would eventually become a viable therapeutic option. This in fact had been preceded by successful kidney, lung and liver transplants, and of course since then surgery has made tremendous inroads and we witnessed the first successful small intestine transplant led by Dr Olivier Goulet in Paris in 1989, hand transplant in 1998, full-face transplant in 2010 and first upper-limb transplant in Canada earlier this year. These have saved the lives of many people and improved the quality of life of countless others.

The next few years will undoubtedly herald impressive advances in the field of BCI's – that's Brain-Computer Interfaces, a technology that originated from the desire to help paraplegics and quadriplegics control computer cursors with their brain. Further advances in this field will undoubtedly bring more liberation to the disabled than ever before, including state-of-the-art BCIs which will enable the control of robotic limbs. An Italian neuroscientist, Dr Sergio Carnavero, believes that a more radical approach will enable him to help those paralysed from the neck down and hopes to carry out the first human head transplant in 2017. In real terms, we're referring to a body transplant, as the head will be acquiring a new body to control, but semantics aside a 31-year-old Russian suffering from a muscle-wasting disorder has already volunteered to be the first recipient.

In theory, two surgical teams will work simultaneously – one on the patient and the other on the donor's body, which will have been selected from a brain-dead patient and endured every conceivable medical test to ensure maximum compatibility. Before squeamish listeners switch off, I hasten to add that I'll spare you all the gory details, apart from mentioning the fact that the most critical step of all – severing spinal cords without damaging them – will be done under an operating microscope using a \$200,000 hi-tech cutting-edge diamond nanoblade, so incredibly thin that it's measured in angstroms. So that you get an idea, one millimetre equals ten million angstroms. Throughout the operation, doctors will ensure a suppressed immune system employing medication, while the patient remains in a drug-induced coma for four weeks to allow his brain to recover. During this time, the spinal cord will be electrically stimulated to encourage communication between neurons, and once he awakens, the recipient will begin his rehabilitation which will include virtual reality training, and hopefully will be able to walk three to six months after surgery.

Obviously, medical opinion is, to say the least, very divided over this issue. Carnavero has been described by his brethren as a charlatan, quack, self-promoter, lunatic and Frankenstein wannabe, while he maintains that his detractors may publicly denounce him but then surreptitiously approach him to learn more.

Chinese surgeons are also preparing for what they hope will be the first human head transplant, and have the added advantage of not being tethered to the same code of ethics as other countries, and perhaps not subject to the influence of similar levels of public outrage and revulsion. Herein lies the dilemma of the incredible technological advances that will be achieved in the coming years: how to harness and adapt them for the common good; improving the lot of the individual while maintaining our notions of what it is to be human.